



Dispenser printed thermoelectric generators

Stepien, L. ; Roch, A. ; Schlaier, S. ; Abt, M.; Hoch, C.; Dani, I.; Van Nong, Ngo; Lukowicz, M. V. ; Leyens, C.

Published in:

Book of Abstracts - 34th Annual International Conference on Thermoelectrics (ICT 2015) and 13th European conference on Thermoelectrics (ECT 2015)

Publication date:

2015

Document Version

Publisher's PDF, also known as Version of record

[Link back to DTU Orbit](#)

Citation (APA):

Stepien, L., Roch, A., Schlaier, S., Abt, M., Hoch, C., Dani, I., Van Nong, N., Lukowicz, M. V., & Leyens, C. (2015). Dispenser printed thermoelectric generators. In *Book of Abstracts - 34th Annual International Conference on Thermoelectrics (ICT 2015) and 13th European conference on Thermoelectrics (ECT 2015)* [9C.2]

General rights

Copyright and moral rights for the publications made accessible in the public portal are retained by the authors and/or other copyright owners and it is a condition of accessing publications that users recognise and abide by the legal requirements associated with these rights.

- Users may download and print one copy of any publication from the public portal for the purpose of private study or research.
- You may not further distribute the material or use it for any profit-making activity or commercial gain
- You may freely distribute the URL identifying the publication in the public portal

If you believe that this document breaches copyright please contact us providing details, and we will remove access to the work immediately and investigate your claim.



BOOK OF ABSTRACT

**34TH ANNUAL INTERNATIONAL CONFERENCE
ON THERMOELECTRICS (ICT 2015)**

AND

**13TH EUROPEAN CONFERENCE
ON THERMOELECTRICS (ECT 2015)**

JUNE 28TH – JULY 2ND, 2015 DRESDEN, GERMANY



WWW.CPFS.MPG.DE/ICT2015

9C.2

Dispenser printed thermoelectric generators

L. Stepien¹, A. Roch¹, S. Schlaier¹, M. Abt¹, C. Hoch¹, I. Dani¹, N. V. Ngo², M. V. Lukowicz³, C. Levens¹

¹ *Fraunhofer Institut für Werkstoff- und Strahltechnik, Winterbergstraße 28, 01277, Dresden, Germany*

² *Department of Energy Conversion and Storage, Technical University of Denmark, DTU Risø Campus, Frederiksborgvej 399, 4000 Roskilde, Denmark.*

³ *Technische Universität Dresden, 01069 Dresden, Germany*

**e-mail of presenting author: lukas.stepien@iws.fraunhofer.de*

To broaden the application of thermoelectric generators (TEG) for waste heat recovery, low priced and environmentally friendly materials and cost-effective scalable manufacturing processes are needed. Dispenser printing method represents a promising technology for the manufacturing of TEG. The process generates 2D and 3D structures or multilayers with a high material utilization.

Several designs of printed TEGs were developed and evaluated. Beneath two vertical designs also the printing of p-type and n-type thermoelectric material into a non-woven substrate was studied. This enables the manufacturing of flexible TEGs in a continuous, automated process.

Polymers are used as thermoelectric material. The intrinsic conducting polymers PEDOT:PSS and PEDOT:tos are typical p-type materials. Beneath the low thermal conductivity, PEDOT has several advantages, such as its high electrical conductivity, good environmental stability and flexibility. Both were modified to increase the Seebeck coefficient, the electrical conductivity, and hence the power factor of the material. PEDOT:tos was synthesized under defined conditions and annealed to optimize the electrical conductivity and Seebeck coefficient. Poly[K_x(Ni-ett)] was synthesized and deployed as n-type polymer.

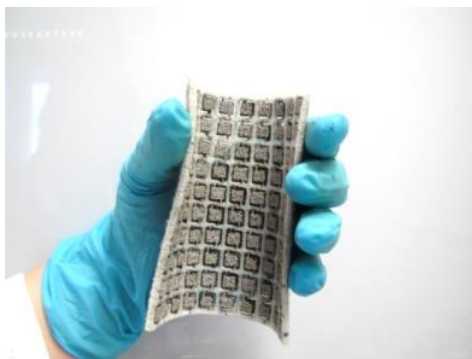


Figure 1. Dispenser printed flexible TEG on non-woven substrate